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REVISION A

PERFORMANCE ORIENTED PACKAGING TESTING OF MK 635 MOD 0 SHIPPING AND STORAGE CONTAINER FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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Qualification tests were performed to determine whether the in-service MK 635 Mod 0 Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 32 kg (70.5 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178. The MK 635 has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.

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POP Test of MK 635 Mod 0 Shipping and Storage Container

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INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the MK 635 Mod 0 Shipping and Storage Container meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The objectives were to evaluate the adequacy of the container in protecting the hazardous materials.

The MK635 Mod 0 Shipping and Storage Container is a steel drum with a removeable lid. Each container lid was secured with a V-retainer and a lead seal during the testing.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Six containers were used during the test series, one for each drop. Three drops were conducted at each orientation listed below from a height of 1.2 meters:

a. 45° from vertical on V-retainer closure
b. Horizontal on container seam (closure of V-retainer positioned 180° from seam)

The tests were performed at ambient temperature (70° ± 20°F). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different containers were used, each with a stack weight of 1000 pounds. This represents the weight imposed on the bottom container of a ten-foot stack of like containers weighing 70.5 pounds each. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

One sample container was loaded with live Flexible Linear Shaped Charges and closed as for shipment. The container was subjected to standard transportation vibration testing for a period of six hours. The test was performed for two hours in each of the three principal axes.

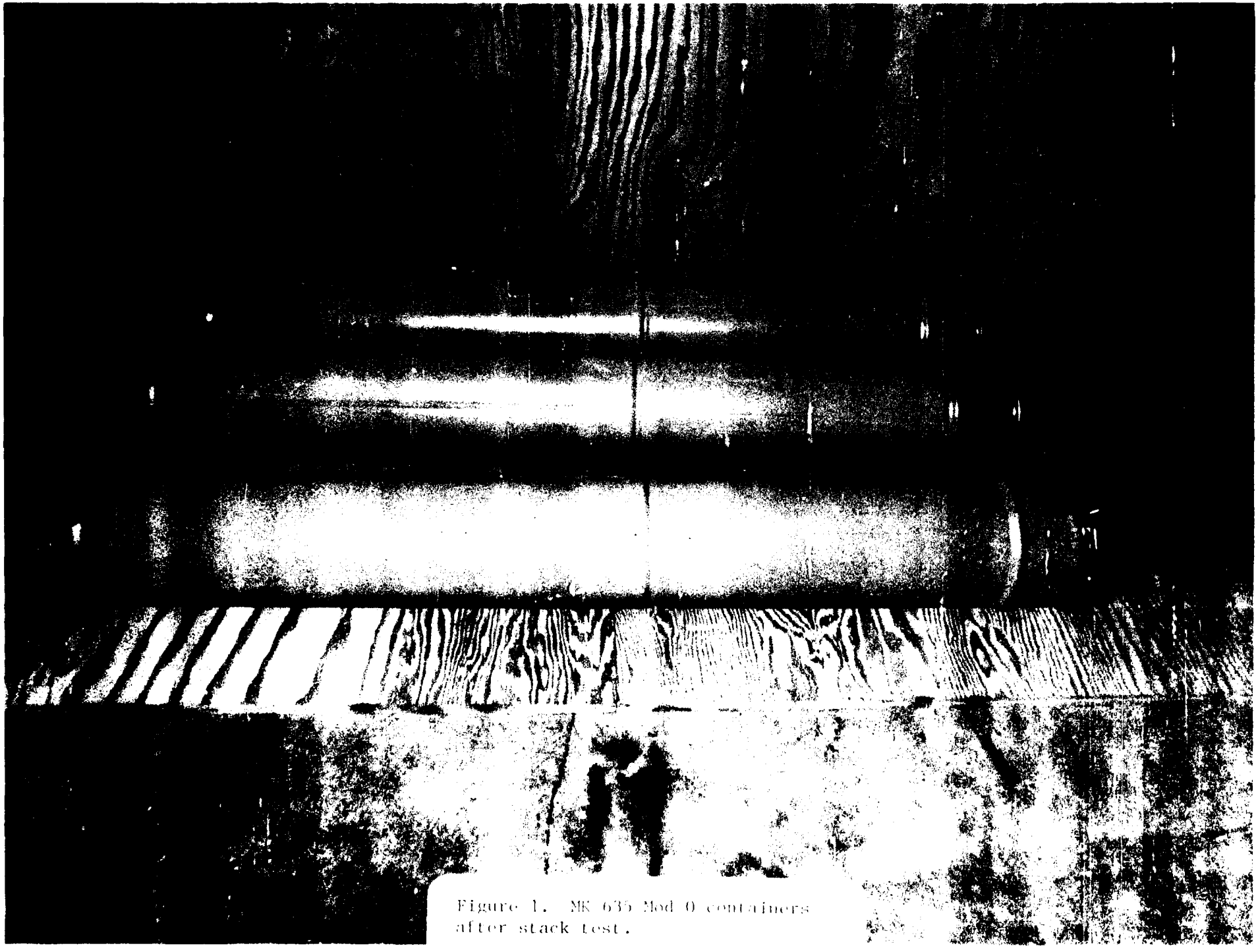

Figure 1. MK 635 Mod 0 containers after stack test.

PASS/FAIL (UN CRITERIA)

The criteria for passing the drop test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, the entire contents are retained by an inner packaging (e.g. a plastic bag) even if the closure on the top head of the drum is no longer sift proof.

2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.606: No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

3. Vibration Test

The criteria for passing the Vibration Test is outlined Title 49 CFR, Part 178, Subpart M, Sec. 178.608: Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The containers were slightly damaged during the tests, but all V-retainers and lead seals remained fastened securely.

2. Stacking Test

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test. The containers are shown in figure 1.

3. Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no evidence of leakage of contents.

REFERENCE MATERIAL

Code of Federal Regulations Title 49 CFR, Parts 107-178.

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DATA SHEET

CONTAINER:	**POP MARKING:**
MK635 Shipping and Storage Container	(un) 1A2/Y32/S/** USA/DOD/NAD
Type: 1A2	UN Code: See Table I
Drawing Number: 53711-3193400	Material: Steel
Gross Weight: 32.0 kg (70.5 pounds)	Dimensions: 1.31 m L x .20 m DIA (51.56" L x 8.0" DIA)
Closure (Method/type): Screw-on cap	Tare Weight: 4.6 kg (10.1 pounds)

Additional Description: Lid secured with V-retainer and lead seal (MS51938-5) during tests. Alternate container nomenclature "CONTAINER, SHIPPING AND STORAGE, FOR NATO SEA GNAT", Drawing 53711-6133117.

PRODUCTS:
See Table I

Proper Shipping Name: See Table II

United Nations Number: See Table I

United Nations Packing Group: II

Physical State: Solid

Amount Per Container: See Table I

Net Weight: Varies

TEST PRODUCT:
Name: Sand
Physical State: Solid

Size: N/A

Quantity: N/A

Dunnage: None
Gross Weight: 32.0 kg (70.5 lbs.)

TABLE I

NALC/ DODIC	NSN	ITEM	PACKING DRAWING	HAZ. CL.	UN NO.	# PER CNTR.	GROSS WT.
3W80	1320-01-247-0627	MK216-0 RF CTG.	6348315	1.3C	0186	1	65.0
3W80	1320-01-352-3678	MK216-1 RF CTG.	6813901			1	65.0
4W35	1320-01-258-0290	MK186-0/E 5.125 CTG.	5186484	1.3J	0247	1	60.0
4W61	1320-01-263-2854	MK229-0 PRAC. CTG.	5177715	1.4S	0173	1	
4W61	1320-01-301-5651	MK229-0 PRAC. CTG.	6375535	1.4S	0173	1	62.0
5W59	1320-01-264-5441	MK186-2 5.125 CTG.	5388289			1	
7W69	1320-01-158-4113	MK182-2 5.125 CTG.	3193399	1.4S	0173	1	60.0
9W22	1320-01-185-8157	MK214-0 RF CTG.	6133075	1.4S	0173	1	62.0
9W22	1320-01-328-5098	MK214-1 RF CTG.	6775105			1	62.0
EW75	1320-01-074-7046	MK186-0 5.125 CRG.	5186484	1.3G	0010	1	60.0
EW75	1320-01-217-8724	MK186-1 5.125 CTG.	5388257	1.3G	0054	1	60.0
EW76	1320-01-045-7859	MK182-1 5.125 CTG.	3193399	1.4S	0173	1	60.0
EW77	1320-01-045-7860	MK193-0 5.125 CTG.	*3193399	1.4S	0173	1	60.0
EW77	1320-01-095-9772	MK193-1 5.125 CTG.	5177715	1.4S	0173	1	62.0
ML09	1375-01-079-3899	20 GR/FT FLEX CHG.	5206261	1.1D	0288	18	19.7
ML10	1375-01-079-3900	30 GR/FT FLEX CHG.	5206262	1.1D	0288	18	21.3
ML11	1375-01-079-3901	40 GR/FT FLEX CHG.	5206263	1.1D	0288	18	22.8
ML12	1375-01-079-3902	60 GR/FT FLEX CHG.	5206264	1.1D	0288	18	26.0
ML13	1375-01-079-3903	75 GR/FT FLEX CHG.	5206265	1.1D	0288	18	28.4
ML14	1375-01-079-3904	125 GR/FT FLEX CHG.	5206266	1.1D	0288	15	33.0
ML15	1375-01-079-3905	225 GR/FT FLEX CHG.	5206267	1.1D	0288	15	46.3
ML16	1375-01-079-3906	300 GR/FT FLEX CHG.	5206268	1.1D	0288	15	54.2
ML17	1375-01-079-3907	400 GR/FT FLEX CHG.	5206269	1.1D	0288	9	48.2
ML18	1375-01-079-3908	500 GR/FT FLEX CHG.	5206270	1.1D	0288	9	56.2
ML19	1375-01-079-3909	600 GR/FT FLEX CHG.	5206271	1.1D	0288	9	64.1
N/A	**	5.125 CRG.	5388375	1.2G	0171	1	57.0
N/A		EX237-0 5.125 CRG.	***	1.3J	0247	1	60.0

* ALTERNATE PACKING DRAWING 53711-5177715
** NATO NUMBER 1320-12-323-1479
*** PACKING SKETCH (53711) 90-D-1536

TABLE II

UN NO.	PROPER SHIPPING NAME
0010	AMMUNITION, INCENDIARY
0054	CARTRIDGES, SIGNAL
0171	AMMUNITION, INCENDIARY
0173	RELEASE DEVICES, EXPLOSIVE
0186	ROCKET MOTORS
0247	AMMUNITION, INCENDIARY
0288	CHARGES, SHAPED, FLEXIBLE, LINEAR